Input interpretation:

<table>
<thead>
<tr>
<th>series</th>
<th>sin(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>point</td>
<td>$x = 0$</td>
</tr>
<tr>
<td>order</td>
<td>$x^{10}$</td>
</tr>
</tbody>
</table>

Series expansion at $x=0$:

$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362880} - \frac{x^{11}}{39916800} + O(x^{12})$$

(Taylor series)

Approximations about $x=0$ up to order 3:

(order $n$ approximation shown with $n$ dots)
Series representations:

\[
\sin(x) = \sum_{k=0}^{\infty} \frac{(-1)^k x^{1+2k}}{(1 + 2k)!}
\]

\[
\sin(x) = \sum_{k=0}^{\infty} (-1)^k \frac{\partial^2 \sin(x)}{\partial x^2} \theta(x)
\]

\[
\sin(x) = 2 \sum_{k=0}^{\infty} (-1)^k J_{1+2k}(x)
\]

\[
\sin(x) = \sum_{k=0}^{\infty} \frac{(-1)^k \left(-\frac{\pi}{2} + x\right)^{2k}}{(2k)!}
\]

- \(n!\) is the factorial function
- \(\theta(x)\) is the Heaviside step function
- \(\delta(x)\) is the Dirac delta function
- \(J_\alpha(x)\) is the Bessel function of the first kind

More information »